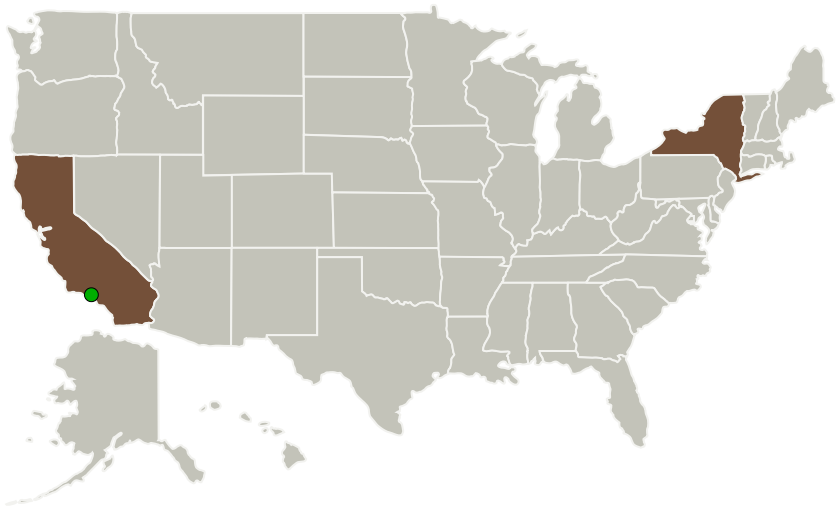
Arm-Deployed Rotary-Percussive Coring Drill, Phase I

Completed Technology Project (2010 - 2010)

Project Introduction

The continued development of automated sample acquisition and handling tools is of critical importance to future robotic missions on Mars, the Moon, Venus, and other planetary bodies. In response to the need for a compact, low mass, low power, and low weight-on-bit coring device, Honeybee Robotics proposes to develop an arm-deployed and arm-stabilized rotary-percussive coring tool. By using a robotic arm to deploy the coring tool into rock or soil targets and stabilize the tool while operating, the coring tool's internal deployment (or "z") axis and external stabilization devices can be removed, resulting in a more compact, lower mass device. Also, adding percussion to the coring tool will reduce average weight-on-bit and energy consumption over the duration of the coring operation. The flexibility afforded from a rover or lander arm to target outcroppings, and the relatively higher TRL of surface coring tools (vs. deeper subsurface drills), make surface coring, especially with an arm-deployed coring tool, a particularly attractive option for near term planetary exploration. The proposed Phase I activities will focus on 1) validating the ability to drill and produce cores in hard rock from a compliant robotic arm mock-up via laboratory testing, and 2) identifying and performing a trade study on vacuum-compatible, low mass percussive mechanism options for the coring tool.

Primary U.S. Work Locations and Key Partners



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Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
Honeybee Robotics, Ltd.	Lead Organization	Industry	Pasadena, California
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
California	New York

Project Transitions

January 2010: Project Start

July 2010: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140047)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Honeybee Robotics, Ltd.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

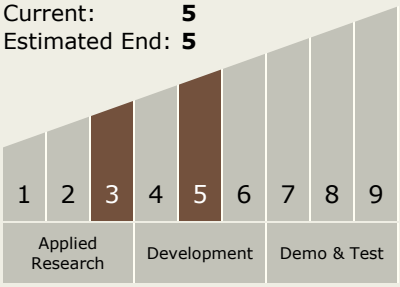
Carlos Torrez

Principal Investigator:

Jack Wilson

Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



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Technology Areas

Primary:

- TX04 Robotic Systems
  - TX04.5 Autonomous Rendezvous and Docking
    - TX04.5.6 Robot Control for Vehicle Capture and Berthing

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System